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the thought that what is indeed most vital about the world is that which also characterizes the highest life of the spirit, namely, the fecundity of whatever unites either electrons or souls or stars into streams or into other aggregations that, amid all chances, illustrate some tendency to orderly cooperation.

If this view of nature has any foundation, gentlemen, then, as the whole progress of inductive science illustrates, the way to further such scientific evolution is to get together, and to leave the rest to the statistically definable tendencies of nature. These are tendencies away from the chance distributions which the bell-shaped curve of random distribution illustrates, towards the orderliness of which the mechanical view of nature gives us one illustration, and by no means the most probably true illustration.

I should suppose, then, that whatever notes you may compare in these meetings, you will probably frequently and variously illustrate the statistical view of nature. This view is ill understood by those who think only how dry statistical tables and averages may seem. Mechanism is rigid, but probably never exactly realized in nature. But life, although it has its history, has also its statistics. And averages cease to be dry when they are averages that express the unities and the mutual assimilations in which the common ideals and interests, the common hopes and destinies of the men, of the social orders, of the deeds—yes, and perhaps of the stars and of all the spiritual world are bound up and are expressed.

Do you wish to experiment upon some new processes of social aggregation, of mutual assimilation, and of the study of photographs of your various spiritual spectra?

This practical question is for you to consider.

Josiah Royce
Harvard University

THE NATIONAL ACADEMY OF SCIENCES

The annual meeting of the Academy will be held in Washington on April 21, 22 and 23, 1914. Following is the tentative program:

MONDAY EVENING, APRIL 20

7:30 P.M.—Meeting of the council in the private dining-room of the Cosmos Club.

TUESDAY, APRIL 21

10:00 A.M.—Business meeting of the Academy in the Oak Room of the Hotel Raleigh.

1:30 P.M.—Luncheon in the private dining-room of the Hotel Raleigh. (In the event of unfinished business, an adjourned business session may be held in the Oak Room following the luncheon.)

4:00 P.M.—Auditorium, National Museum. Inauguration of the William Ellery Hale Lectures by Sir Ernest Rutherford, of the University of Manchester. (Open to the public.) Subject: "The Constitution of Matter and the Evolution of the Elements." (Illustrated.)

9:30 P.M.—Reception to the members of the Academy and their guests, at the home of Alexander Graham Bell.

WEDNESDAY, APRIL 22

10:00 A.M.—Auditorium, National Museum. Public scientific session for the reading of papers.

1:00 P.M.—Luncheon in the Oak Room of the Hotel Raleigh.

2:30 P.M.—Auditorium, National Museum. Public scientific session for the reading of papers.

8:00 P.M.—Annual dinner of the members of the Academy and their guests in the Oak Room of the Hotel Raleigh.

At the annual dinner of the Academy will occur the first presentation of the medal for "Eminence in the Application of Science to the Public Welfare" to George Washington Goethals and William Crawford Gorgas for distinguished service in building the Panama Canal. (Presentation private.)

THURSDAY, APRIL 23

10:00 A.M.—Oak Room, Hotel Raleigh. Business meeting of the Academy for the election

of members, foreign associates and two members of the council.

1:30 P.M.—Luncheon in the private dining-room of the Hotel Raleigh.

4:00 P.M.—Auditorium, National Museum. Second of the William Ellery Hale Lectures, by Sir Ernest Rutherford, of Manchester. (Open to the public.) Subject: "The Constitution of Matter and the Evolution of the Elements." (Illustrated.)

The chairmen of the various trust funds are requested to present at the meeting detailed written reports in accordance with instructions in rule 22, adopted at the annual meeting in 1911, which reads as follows:

The annual reports of the Committees on Research Funds shall, so far as the Academy has authority to determine their form, give a current number to each award, stating the name, position and address of the recipient, the subject of research for which the award is made, and the sum awarded; and in later annual reports the status of the work accomplished under each award previously made shall be announced, until the research is completed, when announcement of its completion and, if published, the title and place of publication shall be stated, and the record of the award shall be reported as closed.

At the scientific sessions of the academy, held in the Auditorium of the National Museum on April 22, papers will be presented as follows:

Pre-Cambrian Algonkian Algæ: CHARLES D. WALCOTT. (Lantern slides.)

Hewettite, Metahewettite and Pascoite, Hydrous Calcium Vanadates: W. F. HILLEBRAND, N. E. MERWIN AND FRED E. WRIGHT.

Two apparently different calcium vanadates are described, which resemble each other very closely and have the same composition—$CaO.3V_2O_5.9H_2O$—when holding their maximum water content at room temperature. One of them—hewettite—occurs at Minasragra, Peru, and has been noticed on a single specimen from Paradox Valley, Colorado. The other—metahewettite—occurs at numerous localities in western Colorado and eastern Utah. Both minerals are sparingly soluble in water. A third calcium vanadate—pascoite ($2CaO.3V_2O_5.11\text{?}H_2O$)— is also described. This occurs with hewettite at Minasragra. It is very soluble in water. The first and second minerals are regarded as hydrated acid hexavanadates—$CaH_2V_6O_{17}.8H_2O$—the third as a normal hexavanadate, $Ca_2V_6O_{17}.11\text{?}H_2O$.

The reasons for specific separation of hewettite and metahewettite are set forth in detail. All three minerals are so sensitive to changes in atmospheric humidity that their water content varies within wide limits at different times of the year. The removal of all or nearly all the water does not result in breaking down of the crystal structure, and until this has occurred the water is wholly or in great part taken up again when opportunity is offered.

The importance is emphasized of bringing all minerals that behave in this way to a definite maximum water content before analyzing them and of following carefully the course of dehydration under prescribed conditions. Detailed directions are given for such tests and for avoiding several sources of error. Attention is also called to two fairly constant associates of metahewettite. One of these (also a constituent of carnotite ores) is a gray hydrous silicate of aluminum, trivalent vanadium and potassium. The other is elemental selenium, the existence of which as a mineral species seems now for the first time established.

The Origin of Monocotyledony: JOHN M. COULTER.

The evidence of vascular anatomy, supported by the historical record, as well as by general morphological considerations, has demonstrated that the Monocotyledons have been derived from the Dicotyledons. It remained to obtain evidence of the transition from dicotyledony to monocotyledony. The two opposing views, each supported by considerable indirect evidence, are (1) that the monocotyledonous condition has arisen by a fusion of the two cotyledons, and (2) that it has arisen by a suppression of one of them.

Material of *Agapanthus umbellatus* (Liliaceæ) obtained from South Africa proved to be occasionally dicotyledonous, so that it was possible to determine the relation between the two conditions. The result has shown that neither one of the theories advanced to explain the origin of monocotyledony is tenable, but that this condition arises from the continuation of one growing point on the cotyledonary ring rather than a differentiation of two growing points. In every case, the cotyledonary apparatus begins as a ring, and continues its growth as one cotyledon or two. It is evident that there is neither suppression of one cotyledon nor fusion of two.

Heredity of Some Emotional Traits: CHARLES B. DAVENPORT.

Among emotional traits, violent temper and un-

controllable eroticism have an hereditary behavior that indicates that they are each due to a single positive determiner which may be regarded as interfering with the inhibitory mechanism. With a slightly less certainty marked cases of "Wanderlust" appear to be inherited as if sex-linked. Illustrated by diagrams and lantern slides.

The Causes of the Clotting of Blood: W. H. Howell.

In circulating blood or lymph a small amount of prothrombin is contained in solution in the plasma. This prothrombin is prevented from reacting with the calcium to form thrombin by the presence of an adequate amount of antithrombin, or, if any thrombin is formed, its coagulating effect on fibrinogen is prevented by the antithrombin. The normal fluidity of the circulating blood is dependent, therefore, upon the presence and action of the antithrombin. In blood-platelets and in leucocytes there is contained a supply of thromboplastic material (phosphatid-compound) and also of prothrombin. On the shedding of blood the disintegration of the platelets and, to a lesser extent, of the leucocytes liberates thromboplastin and prothrombin. The former neutralizes the antithrombin, the latter, together with the prothrombin already present in the plasma, is changed to thrombin by the action of the calcium. Cell-free plasmas may be clotted by the addition of thromboplastin (kephalin) to neutralize the antithrombin.

The Luminescence of Kunzite: Edward L. Nichols and Horace Leonard Howes.

The Prompt Distribution of Convulsants in Cardiectomized Frogs deprived of their Lymph Hearts: S. J. Meltzer.

Several years ago the writer reported that in frogs from which the heart was removed, an injection of strychnin, morphin or acid fuchsin brought on convulsions. For the two latter substances the effect was more prompt and rapid than in animals with normal circulation. The conclusions seemed to be inevitable that the distribution of these substances must take place by some mechanism other than the circulatory apparatus. Two years ago J. J. Abel stated that the success of the experiment depends upon the normal activity of the two anterior lymph hearts; when these are destroyed no convulsions can take place. In recent experiments carried out by Githens, of the Rockefeller Institute, Dr. Joseph, of the University of St. Louis, and by myself in a long series of experiments the lymph hearts were destroyed and after a day or two, when the animals recovered, the heart was removed and the substances injected. The result was as prompt as if the lymph hearts were intact. Furthermore the injections were made this time into the lymph sacs of the thigh and the substances therefore had to travel long distances. Apparently a quite efficient distribution may take place through the connected lymph spaces without the aid of any part of the circulatory apparatus.

Contributions to the Geology of Bermuda: L. V. Pirsson and T. Wayland Vaughan.

Recently a deep well, about 1,400 feet deep, has been bored in Bermuda Island. The samples taken from this well at regular intervals show that there is first penetrated a considerable depth of lime deposits produced by organic life, then follows, down to about 600 feet, brownish weathered igneous rock, after which black unoxidized lavas and igneous material persist to the bottom. The lime deposits contain the remains of organisms. The facts disclosed have important bearings on the origin and geological history of the island and on the problem of coral reef formations. The igneous geology is discussed by L. V. Pirsson and the later history and coral reef problem by Dr. Vaughan.

The lectures founded in memory of the late William Ellery Hale, of Chicago, will be inaugurated by Sir Ernest Rutherford, of the University of Manchester, who will speak in the Auditorium of the National Museum, Washington, D. C., on April 21 and 23, 1914, at 4 P.M.

The committee in charge has planned a series of such lectures covering several years on the general subject of evolution, which is designed to give a clear and comprehensive outline of the broad features of inorganic and organic evolution in the light of recent research. Sir Ernest Rutherford's lectures will deal with the Constitution of Matter and the Evolution of the Elements. Aided by many illustrations, including some of the experiments which brought to him the award of the Nobel Prize, Sir Ernest will explain how the discovery of radio-activity and the study of the electron have revolutionized our views on the nature of matter. By these new means of investigation, the chemical elements and the complex compounds which they unite to form may be shown to consist of units of positive and negative electricity. Moreover, all nega-

tive electrons are precisely alike, from whatever form of matter they may be derived. Thus we are prepared to witness some of the transformations of the chemical elements, such as the spontaneous disintegration of radium and the production of helium from it.

These addresses on the fundamental structure of matter will prepare the way for succeeding lectures, which will deal with the various transformations of matter involved in the evolution of the earth and its inhabitants.

The second course in the Evolution Series will be given at the next autumn meeting of the Academy by Dr. William Wallace Campbell, director of the Lick Observatory, Mount Hamilton, California. Provided with his raw material, as it were, by Sir Ernest Rutherford, Dr. Campbell will sketch the various types of bodies which make up the universe, describe their connection in systems, and explain the principal theories of stellar evolution. His object will be to show how stars and stellar systems are gradually evolved from an earlier state and to afford a view of the earth in its first phases of development. In this way the intimate relationship of the earth with the moon and the other bodies of the solar system will be made apparent, as well as the continuity of the process which connects the present with the remote past. Dr. Campbell will introduce some of the results of his extensive researches with the powerful instruments of the Lick Observatory and will employ a large collection of astronomical photographs for illustration purposes.

A distinguished European geologist will be invited to give the third course of lectures at the annual meeting of the Academy in 1915. Taking the earth from the hands of the astronomer, he will show how its surface features have been altered in the process of time. Later lectures, preserving the continuity of the series, will then enter the field of organic evolution and illustrate the bearing of recent investigations in paleontology, zoology and botany on the evolution of plant and animal life. The evolution of man will form the subject of a subsequent course, and the series will close with an account of the rise of the earliest civilizations, coming into touch with modern times in the life of the Nile Valley.

In all cases the lectures will be given by leading European and American investigators, whose personal researches have contributed largely toward the development of the fields of science which they represent. Every effort will be made to secure continuity and homogeneity of treatment, in order that the published lectures may unite into an adequate and well-balanced description of evolution in the broadest sense. The lecturers chosen will be able to eliminate unessential technicalities and to present their subjects clearly and intelligibly to general audiences. The series on Evolution should therefore appeal to a large public, interested in the broader aspects of science, but not necessarily familiar with its special methods or technical details.

The lectures will be open to the public without charge, and a cordial invitation is extended to all who may wish to attend them.

ARTHUR L. DAY,
Home Secretary
SMITHSONIAN INSTITUTION,
WASHINGTON, D. C.

THE AMERICAN PHYSICAL SOCIETY

A REGULAR meeting of the Physical Society will be held at the Bureau of Standards, Washington, on April 24 and 25. Morning sessions will begin at 9:30.

Attention is directed to the following special features of the coming meeting:

1. The members of the Physical Society are invited by the National Academy of Sciences to attend the William Ellery Hale lectures by Sir Ernest Rutherford, F.R.S., upon "The Constitution of Matter and the Evolution of the Elements" (illustrated). The lectures are two in number, and are delivered in the auditorium of the National Museum on April 21, and April 23, at 4:00 P. M.

2. A special attraction will be the exhibit of apparatus arranged by a local committee of the Physical Society. Thus far entries have been received from more than thirty manufacturers, importers and industrial research estab-